REMARKS

The Office examined claims 1-20 and 30-34 and rejected same. With this paper, claims 1, 3, 5, 6, 9, 10, 12, 13, 17-19 and 30-34 are amended, claim 4 is canceled and new claims 35-43 are added. The application now includes claims 1-3, 5-20 and 30-43.

The subject matter of the new claim 35 is initially disclosed on page 12, lines 4-15 of the originally filed specification. The subject matter of new claim 36 is evident and unambiguously obtainable from the disclosure on page 11, lines 11-18 and 26-31; page 12, lines 16-32; and page 19, lines 9-18. Once the signal phase is obtained from the pilot channel, the carrier signal for smoothing the signal phase is obtained from the communication signal, for example in the synchronization channel, the paging channel or the traffic channel. New claims 37-43 provide the same features as new claims 35 and 36. The other claims refer to the respective previously presented claims.

Claim Rejections under 35 USC §102

Claims 1-20 and 30-34 are rejected under 35 USC 102(e) as being anticipated by Chansarkar (WO 03/034090 A2, Chansarkar hereinafter).

The present invention relates to a method for calculating a position of a mobile communication device (such as a mobile station). The mobile station communicates with base stations via physical communication channels. The method comprises receiving signals from the physical communication channels, such signals including a first signal code and a carrier signal, measuring a signal phase of the first signal code, measuring a frequency shift of the carrier signal, reducing a noise level of the measured signal phase by using the frequency shift, and calculating a position of the mobile communication device using at least the noise level reduced signal phase.

In the specification, it is further described that a pilot channel is provided within these communication channels. This pilot channel communicates a pilot signal to the mobile station. The pilot signal is modulated with a pseudo noise (PN) code. A signal phase of the received pilot signal may be used for measuring a position of the mobile station.

It has been found that the noise level of the signal phase affects the accuracy of the positioning calculation. Therefore, the invention provides a solution, that in addition to measuring the signal phase of the pilot signal, a frequency shift of a carrier signal is also measured, and the frequency shift is used to reduce the noise of the measure signal phase. The noise level reduced signal phase, in turn, is used for calculating a position of the mobile communication device.

In particular, the carrier signal may be provided by paging channels or traffic channels, which are provided together with the synchronization channel (pilot signal channel) on which the signal code is provided.

In further particular, the frequency shift may be a pseudodoppler frequency of the carrier signal. The pseudodoppler frequency is used for reducing a noise level of the measured signal phase. The reduced signal phase is then used for calculating the position of the mobile communication device.

In short terms, the present invention utilizes two signals for calculating the position of the mobile device. The first signal is a synchronization signal carrying signal codes, for example PN codes. These codes are used for calculating a signal phase. The second signal is a carrier signal, which is used for measuring a frequency shift. The noise level of the signal phase is reduced by utilizing the frequency shift.

Clearly, the present invention pertains to positioning of a mobile communication device. There is a clear distinction between sole positioning devices, such as GPS-receivers, and the communication devices, such as mobile phones. Using the term mobile communication device for a GPS-receiver is not correct, as a GPS-receiver does not provide mobile communication functions, but rather for mobile positioning through reception of signals from satellites. In particular, as claimed, the signal code and the carrier signal are received and measured from physical communication channels. The signals obtained from GPS satellites cannot be understood as via physical communication channels, as these do not provide for communication, but only unidirectional information transfer from the satellite to the receiver.

Chansarkar solely relates to GPS-receivers, thus not being in the same technical field as the invention. Because the device according to Chansarkar does not receive communication

channels, but rather spread spectrum positioning signals from the satellites, these references are not capable of showing all features of the invention.

According to Chansarkar, a spread spectrum signal with a PN code is received within a GPS-receiver. The received spread spectrum signal is combined with a local PN signal code. To calculate the phase offset between the received PN code and the locally produced PN code, these signals are processed, and a degree of correlation of these PN codes is obtained (Section 00017).

For generating the local PN code, a voltage controlled oscillator (VCO) or a numerical controlled oscillator (NCO) provides a control clock and it is fed by a variable code-tracking loop filter. The output of the VCO or the NCO is such that the locally PN sequence is adjusted relative to the PN code contain the incoming spread spectrum signal (Sections 00018 and 00019).

In order to drive the variable code-tracking loop filter, a local in phase signal stream and a quadrature phase signal stream are generated (Section 00023). These local signals are multiplied with the input spread spectrum signal (Section 00025). The resulting two components, I and Q, are computed by an error detector and determine the phase and frequency errors. The phase and frequency errors are the estimates of the phase error and frequency error between the input data and the local signal (Section 00026). Based on the phase and frequency errors, the variable code-tracking loop filter operates with different parameters (Sections 27 and 28). By changing the parameters, the variable code-tracking loop filter reduces its bandwidth resulting in an improvement in noise performance and sensitivity (Section 00029).

It is therefore clear that, in Chansarkar, there is no disclosure provided regarding the measuring of a frequency shift of a carrier signal received within physical communication channels in a mobile communication device, as claimed in claim 1 of the present invention. Further, there is no disclosure in Chansarkar that teaches reducing a noise level of a measured signal phase by using the frequency shift of the carrier signal. In fact, in Chansarkar, the received coded signal is used to create a phase and frequency error, which is then used to modify the variable code-tracking loop. There is no mentioning of measuring any property of a signal different than the spread spectrum signal, and the property is used to reduce the noise level of the measured signal phase of the spread spectrum signal.

Because Chansarkar solely relates to the GPS-based navigation, using communication channels and improving positioning using information from the communication channels is not addressed at all. For this reason, the person skilled in the art would not find any teaching or suggestion in Chansarkar in order to come up with the present invention.

Therefore, claim 1 is not anticipated by Chansarkar. Applicant respectfully requests the rejection of claim 1, and all dependent claims thereof, be reconsidered and withdrawn.

Other claims of the application contain features corresponding to claim 1. Therefore, these claims are patentable as well. Applicant respectfully requests the rejection of these claims also be reconsidered and withdrawn.

Conclusion

For all the foregoing reasons, it is believed that all of the claims of the application are in condition for allowance and their passage to issue is earnestly solicited. Applicant urges the Examiner to call the undersigned agent to discuss the present response if there are any questions.

Respectfully submitted,

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